A Statistical Learning View of Simple Kriging. Connection with Kernel Ridge Regression

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Résumé

The practice of machine learning has been successfully developed these last decades with the design of many efficient algorithms (e.g. boosting methods, SVM, deep neural networks) for carrying out various tasks such as classification, regression or clustering. It is supported by a sound probabilistic theory, essentially relying on the theory of empirical processes, i.e. collections of independent and identically distributed averages. In the Big Data era, we are facing situations where the massive datasets contain geolocated, spatially dependent observations. In this context, the usual theory of statistical learning does not provide any theoretical guarantee of the generalization capacity of rules learnt from data. We consider here the simple kriging task, the flagship problem in geostatistics: the values of a square integrable random field $X=
X_s
_{s∈ S}$, $S ⊂ {R}2$, *withunknowncovariancestructurearetobepredictedwithminimumquadraticrisk*, *baseduponobser*

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